DOE Exhibit 2.0

STATE OF ILLINOIS

ILLINOIS COMMERCE COMMISSION

COMMONWEALTH EDISON COMPANY



Petition for approval of delivery services tariffs and tariff revisions and of residential delivery services implementation plan, and for approval of certain other amendments and additions to its rates, terms and conditions.

) DOCKET NO. 01-0423

# SURREBUTTAL TESTIMONY TO THE COMPANY

# REBUTTAL TESTIMONY TO OTHER INTERVENORS

# AND ACCOMPANYING EXHIBITS

OF

DR. DALE E. SWAN

ON BEHALF OF

THE

UNITED STATES DEPARTMENT OF ENERGY

OCTOBER 2001

EXETER
ASSOCIATES, INC.
12510 Prosperity Drive
Suite 350
Silver Spring, Maryland 20904

DOE Exhibit 2.0

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SURREBUTTAL TESTIMONY TO THE COMPANY

REBUTTAL TESTIMONY TO OTHER INTERVENORS

OF

DR. DALE E. SWAN

Q. PLEASE STATE YOUR NAME, OCCUPATION AND ADDRESS.

A. My name is Dale E. Swan. I am a senior economist and principal with Exeter Associates. Our offices are located at 12510 Prosperity Drive, Silver Spring, Maryland 20904.

Q. ARE YOU THE SAME DALE E. SWAN WHO SUBMITTED DIRECT TESTIMONY IN THIS PROCEEDING?

A. Yes.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. I shall respond to a number of criticisms raised by various intervenor witnesses to the use of marginal costs to determine rates in this proceeding, and also offer an adjustment to the Company's marginal cost estimates that may meet some of these concerns. I shall also offer some brief comments on the issue of determining metering and billing backout

credits, and I shall respond to a number of intervenor and Company witnesses' comments on the design of High Voltage Delivery Services rates.

**Marginal v. Embedded Costs**

Q. WHAT TYPES OF CRITICISMS HAVE BEEN MADE BY OTHER INTERVENOR WITNESSES REGARDING THE COMPANY'S PROPOSAL TO BASE CLASS REVENUE REQUIREMENTS AND RATES ON ITS ESTIMATES OF MARGINAL COSTS?

A. The criticisms that have been made by other witnesses generally fall into three broad categories:

1. There is no acceptable basis in theory or concept for using marginal costs.
2. Embedded costs are much easier and less controversial to calculate than are marginal costs.
3. The Company's estimates of marginal costs are unsound and therefore cannot be used as the basis for setting class revenues or designing rates.

Q. WHAT ARGUMENTS HAVE BEEN MADE THAT THERE IS NO ACCEPTABLE BASIS IN THEORY OR CONCEPT FOR USING MARGINAL COSTS?

A. These kinds of arguments have been presented by Mr. Lazare for Staff and by Mr. Chalfont on behalf of the Illinois Industrial Energy Consumers (IIEC). Let me begin with Mr. Lazare's concerns. He begins by stating that, whereas marginal cost pricing is appropriate in the "artificial world of perfect competition" it cannot be applied to real world markets. Mr. Lazare is quite simply incorrect. The perfectly competitive model is a simplification of how the competitive market leads to maximum consumer welfare,

given the constraint of limited resources. The model demonstrates that consumers are made better off when prices tend toward the level of marginal costs. Reasonably competitive markets in the real world tend to behave in the same way. This can be demonstrated by observing the prices of electric energy in any of the recently developed competitive markets. While price movements can be rather volatile in response to short run supply/demand imbalances, prices tend to move toward the long run incremental cost of new entrants in the forward markets. When it comes to setting prices for a regulated monopolist, regulators have long used the results of the perfectly competitive model as a basis upon which to set rates. In short, regulators have long attempted to reflect in their regulated outcomes the conditions that would obtain in a perfectly competitive world.

Q. DOES THIS APPLY TO REGULATORS DETERMINING THE DESIGN OF RATES IN ADDITION TO DETERMINING THE RATE LEVEL OR REVENUE REQUIREMENT?

A. There certainly is a longer history of regulators setting the revenue requirement to emulate the rate level that would obtain in a competitive world. However, increased focus began to be placed on designing rate structures based on a competitive solution (i.e., rates reflective of marginal costs) as early as the 1960's. Contrary to Mr. Lazare's suggestion that, "The argument [for marginal cost pricing] is fundamentally flawed," there is an extensive literature in economics promoting the use of marginal cost pricing in regulating monopoly utilities. The long list of economists who favor the use of marginal cost pricing includes such luminaries in the field of economics and regulation as Professor William Baumol, who testified in the initial delivery services case for the Company, Professor James Bonbright and Dr. Alfred Kahn.

Q. WHAT SPECIFIC CRITICISM DOES MR. LAZARE RAISE TO SUPPORT HIS POSITION THAT THE ARGUMENT FOR MARGINAL-COST PRICING IS "FUNDAMENTALLY FLAWED"?

A. The main point raised by Mr. Lazare seems to be that, because marginal costs must be adjusted to equal the allowed total revenue requirement, "no rate element will actually reflect its associated marginal cost." His primary objection seems to be to the revenue reconciliation method used by the Company – the method referred to as the "Equal Percentage of Marginal Cost." Under this method, when the embedded revenue requirement is less than the sum of all marginal costs, then each cost element is reduced by an equal percentage, based on the ratio of the embedded revenue requirement to the sum of marginal costs. Since, under this method, no rate would actually equal the marginal cost, Mr. Lazare concludes that there is no meaningful relationship between rates and marginal costs.

Q. DO YOU AGREE WITH MR. LAZARE'S ANALYSIS?

A. No. There is an extensive literature regarding how to reconcile the embedded revenue requirement with marginal costs in a manner that minimizes the distortions in consumption patterns that would result from rates equal to marginal costs. The issue can be summarized briefly by asking which rates should be allowed to deviate from marginal cost in order to minimize the adverse effect on economic efficiency. Since rates cannot be set at marginal costs, but must be set below marginal costs to recover the lower allowed level of jurisdictional revenues (whatever that turns out to be), the objective is to set rates so as to minimize the distortions that result compared to usage that would occur under rates set equal to marginal costs. The kind of pricing that is maximally efficient when revenues must be recovered that differ from marginal costs is referred to as

"Ramsey Pricing" or "Inverse Elasticity Rule" (IER) pricing. This kind of pricing sets rates in inverse proportion to the price elasticity of demand for different components of service and/or in inverse proportion to the price elasticity of demand of different customer groups for the same commodity or service. In fact, there are no sufficiently reliable and accurate estimates of class price elasticities for distribution delivery services to permit any kind of mechanical application of the Inverse Elasticity Rule in determining class revenue responsibilities. Therefore, if one assumes that these elasticities are equal for each class of customers, applying the Inverse Elasticity Rule would result in revenues for each class that are the same percentage of class marginal costs. Thus, with equal class price elasticities, the maximally efficient spread of the allowed jurisdictional revenues would be the allocation based on an unconstrained application of the method referred to as the Equal Percentage of Marginal Cost (EPMC) method. That is precisely what the Company has proposed to do. While I believe that the result is an equitable solution because it allocates the embedded revenue responsibility in proportion to the economic costs that each class imposes on the system, it is important to stress that the EPMC results are the maximally efficient results, given that prices must deviate from marginal cost and that there are no reliable data on relative class price elasticities.

Q. ARE THERE OTHER THAN EQUIPROPORTIONAL ADJUSTMENTS THAT COULD BE MADE TO THE PRICES OF DIFFERENT COMPONENTS OF SERVICE WITHIN CLASSES THAT MIGHT IMPROVE ECONOMIC EFFICIENCY?

A. Yes. There probably is general agreement that certain non-usage sensitive components of service have much lower price elasticities, and so the prices of these components of service ought to deviate most from marginal cost. The usual candidate for the non-usage

sensitive component is system access – specifically the customer charge and meter charges. If the Commission were to judge that there would be little or no response in terms of changes in consumption to changes in customer charges, then efficiency improvements could be achieved by reducing customer charges and leaving distribution facilities charges at or nearer to their marginal costs.

Q. IT HAS BEEN SUGGESTED THAT IT IS UNUSUAL THAT MARGINAL COSTS EXCEED THE EMBEDDED COSTS OF THE DISTRIBUTION SYSTEM. DO YOU AGREE?

A. No. Mr. Chalfont has suggested that, if electric distribution has significant scale economies, then marginal costs should be less than average cost. The problem with Mr. Chalfont's argument is that marginal cost must reflect the current, incremental cost of providing additional service. Embedded costs, on the other hand, reflect the historical accounting costs that are on the books, including the much lower prices that were paid for distribution plant when it was installed 20, 30, 40 or even 50 years ago. Mr. Chalfont goes on to state that this problem reveals that what the Company has calculated is simply replacement costs not marginal cost. In fact, there must be a close correlation between the incremental cost of providing additional output (marginal cost) and the cost of new equipment to meet loads placed on the system (replacement costs). This critical relationship between the higher cost of meeting incremental load and replacement cost has been an important factor in the FERC's decisions about who should pay for the much higher cost of new transmission compared to the average embedded cost of the existing transmission system. It is the fact that the cost of meeting additional load is much higher than the average embedded cost of meeting existing load that has led to much of the

acrimony in the establishment of open transmission access and regional transmission organizations.

Q. HAS MR. CHALFONT RAISED ANY OTHER CONCEPTUAL CRITICISMS OF THE USE OF MARGINAL COSTS TO SET PRICES?

A. Yes. Mr. Chalfont has raised an esoteric theoretical objection to the use of marginal costs that essentially says, if you can't do something perfectly correct, then do nothing. This is the so-called theory of the "second best." Essentially, Mr. Chalfont argues that we only achieve maximum economic efficiency when all prices of all goods and services are equal to the marginal costs of providing all those goods and services. Since the Commission cannot ensure that all prices, other than those it sets, are equal to marginal costs, then there is no sense in worrying about whether the prices it does set are prices that will promote economic efficiency.

Q. DO YOU BELIEVE THAT THE COMMISSION SHOULD ABSTAIN FROM CONSIDERING THE ECONOMIC EFFICIENCY IMPACTS OF THE PRICES IT SETS BECAUSE OF THE SECOND BEST CONCERNS RAISED BY MR. CHALFONT?

A. No. Policy makers must act, including regulators and judges who make decisions in anti-trust cases. They cannot throw their hands up in despair because of the esoteric concern raised by Mr. Chalfont. If the issue raised by Mr. Chalfont were dispositive, then there would be little or no economic policy activities undertaken to improve the lot of consumers, and there would be little basis for having regulators such as the Illinois Commerce Commission.

Q. WHY SHOULD THE COMMISSION RETURN TO USING MARGINAL COST AS OPPOSED TO EMBEDDED COST TO DETERMINE CLASS REVENUES AND TO DESIGN RATES?

A. There is no basis in economic theory to use embedded costs to set rates. Embedded costs reflect an average of past costs that remain on the books. They bear no relationship to the cost that must be incurred by the utility in the future as it continues to serve both its existing and new customers and loads. While it is suggested that using embedded costs is an easier task, I will explain shortly that apparent simplicity is itself a fiction. All we know for sure is that embedded costs are clearly the wrong costs to be used in setting rates that lead to economically efficient results. I would urge the Commission to return to the forward-looking leadership role it played for nearly two decades in its numerous decisions to base class revenues and rates on marginal as opposed to embedded costs.

Q. MR. LAZARE HAS EMPHASIZED THAT THE USE OF EMBEDDED COSTS IS CONSISTENT WITH COMMISSION PRECEDENT. WOULD YOU COMMENT ON MR. LAZARE'S POSITION.

A. Mr. Larzare is correct that the Commission decided to use embedded costs in Docket No. 99-0117, the first ComEd delivery services case. However, that decision should be put in context. The Illinois Commerce Commission based its decisions on marginal costs for almost the previous two decades. I have read carefully the Commission's Order in Docket No. 99-0117, and I do not find there a wholesale condemnation of marginal cost pricing. What I find is the reflection of a dilemma that the Commission faces regarding how to establish credits for those minor portions of delivery service that are open to competition – metering and billing functions – that further the realization of economic efficiency, but are also fair to new competitors offering those services. As I will suggest

later in this testimony, I believe this dilemma can be addressed without throwing out the previous two decades commitment to marginal cost pricing. Thus, I believe it is appropriate for the Commission to revisit its decision in Docket No. 99-0117.

Q. PLEASE COMMENT ON THE SECOND CATEGORY OF CRITICISMS THAT EMBEDDED COSTS ARE MUCH EASIER AND LESS CONTROVERSIAL TO CALCULATE THAN ARE MARGINAL COSTS.

A. Mr. Lazare, Mr. Luth and Mr. Chalfont have dragged out the old arguments against the use of marginal costs that were marshalled two decades ago when the marginal versus embedded cost debate was first aired before this Commission – that marginal costs are difficult to measure and are controversial, whereas embedded costs are easy to measure, are actual costs that are on the books of account and are, by implication, non-controversial. To wit, consider the following comments from each of these witnesses:

> "[Embedded costs]...are easier to determine than marginal costs because embedded costs represent the actual costs that utilities incur in the course of operation. Furthermore, embedded costs, in contrast to marginal costs, do not have to be adjusted up or down to produce the revenue requirement." (Lazare, ICC Staff Exhibit 7.0, p. 9)
>
> "...there has never been a general agreement on how marginal costs should be calculated." (Chalfont, IIEC Exhibit 2, p. 11)
>
> "...ComEd's marginal COSS does not look at the costs actually incurred on the ComEd system, but rather looks at the costs that a hypothetical new customer may impose on the distribution system by connecting to the distribution system. An embedded COSS measures actual costs, rather than hypothetical costs, based upon the activities (demand for electricity) that caused the costs that are to be recovered." (Luth, ICC Staff Exhibit 6.0, p. 4)

Q. HOW DO YOU RESPOND TO THIS COMPARISON BETWEEN MARGINAL AND EMBEDDED COSTS?

A. The argument is fallacious and misleading. Embedded costs are no more "actual" than are marginal costs. The marginal costs that the Company will incur to serve additional customers and/or additional load are real and actual. They are as "actual" as the embedded costs that each of these witnesses espouse. If by "actual" these witnesses mean past costs, then I submit these "actual" costs are absolutely the wrong costs to use for the determination of rates. What this Commission needs to reflect in rates are forward-looking costs. It makes practical as well as theoretical sense to determine today's price for distribution service on the basis of today's or tomorrow's cost of using the facilities required to provide that service, rather than on the basis of the cost of facilities that were installed 20, 30, 40 or even 50 years ago.

The truly misleading aspect of this argument is that embedded costs are non-controversial whereas the calculation of marginal cost is fraught with controversy. Clearly the calculation of marginal cost is not an exact science, and that will lead to controversy among parties whose financial positions will be directly affected by the way in which marginal costs are calculated. But the very same concern applies equally to embedded cost. The very fact that Staff's proposed revenue requirement (read total embedded cost) is $172 million or 10 percent less than the Company's determination of embedded cost is ample testimony to this fact. Moreover, the total allowed embedded cost provides little guidance in the determination of class revenue requirements or the design of rates. The total embedded cost must be allocated to the classes and then rates must be designed for the various components of service to recover these revenues from the classes. To suggest that there is no controversy surrounding the allocation of total embedded costs to the classes and then to the components of service within classes is to deny the other aspects of both the IIEC and Staff proposals in this case. Both Mr. Luth and Mr. Chalfont

propose changes to the Company's determination of the "actual" embedded cost of serving the various customer classes. Numerous other parties propose similar adjustments. For example, Mr. Bodmer, on behalf of the City of Chicago and other parties, has proposed to reduce the share of total embedded costs allocated to residential customers by 18 percent compared to the Company's estimate of the embedded cost of serving residential customers. One can hardly conclude from these presentations that the method of calculating embedded cost is generally agreed to and non-controversial.

Finally, it is truly ironic that Mr. Lazare extols the virtue of embedded costs because, "...in contrast to marginal costs, [they] do not have to be adjusted up or down to produce the revenue requirement." And then, his associate, Mr. Luth, essentially adjusts the Company's calculation of class embedded costs by the ratio of Staff's recommended revenue requirement to the revenue requirement requested by the Company, a reduction of each class' assigned embedded costs by approximately 10 percent.

Q. PLEASE TURN TO THE LAST CATEGORY OF CRITICISMS REGARDING THE USE OF MARGINAL COSTS – THAT THE COMPANY'S ESTIMATES ARE UNSOUND AND THEREFORE CANNOT BE USED AS THE BASIS FOR SETTING CLASS REVENUES OR DESIGNING RATES.

A. The basic objection to the Company's calculation of marginal costs seems to be that the Company relied heavily on the replacement cost of facilities. This theme runs through the testimony of Mr. Luth for Staff, Mr. Chalfont for the IIEC, and Mr. Bodmer for City of Chicago, et. al. Let me address this basic concern shortly. But first, I would like to comment on a related issue that is raised by Mr. Luth. Mr. Luth criticizes the Company's estimates because they do not account for the differences in costs between customers in different geographic areas and between existing and new customers. Mr. Luth complains

that the Company uses a broad average of costs within a class despite the fact that there are cost differences between providing service in low-cost as opposed to high-cost regions, and between customers who have existing facilities and those whose demands will require new facilities.

While there is a serious error in the underlying logic regarding the marginal cost of serving new and old customers, which I shall address shortly, this is not a criticism which, if valid, is unique to marginal costs. Embedded average cost, when used to set rates for a class, is clearly, by definition, an average of the cost of serving all the customers in that class. Embedded costs do not differentiate the cost of serving customers in different geographic regions nor between existing and new customers or loads. Whatever the validity of the criticism, it applies equally to marginal and embedded costing. Further, whether this argument is relevant is, in part, a function of whether the Commission is interested in abandoning decades of postage stamp ratemaking in favor of rates that are differentiated among the areas served by ComEd, and in favor of vintaged rates for like customers, depending on when the customer first joined the system. I wager that the Commission has little interest in moving in either of these directions.

Q. PLEASE ADDRESS THE BASIC CONCERN THAT THE COMPANY'S MARGINAL COST ESTIMATES RELY ON THE USE OF REPLACEMENT COSTS.

A. The objection to the use of replacement facility cost as the basis for the capital cost component of marginal costs rests on the notion that customers who are served by existing facilities, and who do not have load increases that will require the construction of additional distribution capacity, do not impose costs on the margin. They are inframarginal customers by this logic. Rather, according to the logic employed by Mr.

Bodmer and Mr. Luth, marginal capital costs for additional capacity are only imposed by new customers and existing customers with new loads in areas where there is no excess capacity. Thus, one implication is that there needs to be differential rates reflecting the cost differences between customers in different parts of the distribution system, and between old and new customers and old and new loads. This gets back to the issue I just raised whether the Commission wishes to depart from postage stamp rates.

The more fundamental question, however, is whether there really are relevant cost differences between serving loads on different parts of the distribution system and between serving old and new loads. Consider first what time horizon is at issue. In the short run, when facilities are fixed, there will be differences in the cost of serving additional loads in different regions. In the long run, however, with sufficient time to adjust the capacity of the system in different parts of the system, those costs should move toward the same long-run marginal cost, which will be the cost of new facilities – i.e., the replacement cost. As a general proposition, most regulatory commissions that utilize marginal cost ratemaking, including the ICC, have determined that rates should be determined on the basis of intermediate or long-run marginal costs.

Q. IN THEORY COULD RATES BE DIFFERENTIATED AMONG THE DISTRIBUTION SUBSYSTEMS TO REFLECT SHORT-RUN RELATIVE SHORTAGES AND EXCESSES OF CAPACITY?

A. Yes. In theory, if one had the necessary information on a real-time basis, one could estimate and charge for congestion costs, just as those charges are imposed in certain transmission control areas, such as by the California Independent System Operator. However, the kind of real-time data that would be required simply do not exist for most

utilities, and this kind of pricing would, once again, require the abandonment of postage stamp rates.

Q. IS IT APPROPRIATE TO DIFFERENTIATE BETWEEN THE MARGINAL COST OF SERVING EXISTING AND NEW LOAD ON THE SYSTEM?

A. No. This is the fundamental error that is made by those who believe costs should be estimated differently for existing and new loads – this particularly includes Mr. Luth and Mr. Bodmer. The error is in concluding that only new customers or new loads are consuming on the margin. In the long-run all customers who use the common distribution system are consuming on the margin and therefor all such customers impose the same marginal cost on the system. The capital cost of meeting those loads, whether old or new, is the cost of new facilities that must be added -- that is, the replacement cost.

The test is whether the facilities in question are common facilities. That is, do they serve the needs of many customers or are they dedicated to the service of a particular customer. As one moves farther upstream from the customer, one finds that facilities are more clearly common facilities. Most high voltage transmission lines serve the requirements of many customers. As one move downstream toward the customer's meter, facilities serve a smaller number of customers. However, most facilities above the service drop are not dedicated and so must be considered common facilities, which have common costs. The importance of this observation is that, if new load is placed on those facilities, the new load could be facilitated, even if those facilities were being used to full capacity, if a sufficient amount of existing load would be reduced. In short, every kW of load that is placed on those facilities is at the margin and imposes a marginal cost. The proper way to price distribution service for all of that load is to base the rate on the

marginal cost of service, which will properly reflect the cost of new facilities – i.e., the replacement cost.

Q. WHAT ABOUT THE MEASUREMENT OF THE CAPITAL COST OF SERVICE DROPS AND METERS?

A. The issue is quite different with regard to service drops and meters because those facilities are dedicated to specific customers. That means that a significant portion of the capital cost of those facilities is likely to be sunk. Sunk costs are not marginal in either the long run or the short run. Therefore, the marginal cost estimating procedure must account for the portion of these costs that is sunk. This gets to one of the major concerns raised by Mr. Bodmer. He argues that customer costs are too high in the Company's marginal cost study because the cost of meters and service drops are set at replacement costs and multiplied by the total number of customers. I agree with Mr. Bodmer because the Company has not accounted for the portion of those replacement costs that is essentially sunk and not marginal.

Q. DR. SWAN, HAVE YOU ADDRESSED THIS ISSUE BEFORE THE ILLINOIS COMMERCE COMMISSION IN PREVIOUS COMED CASES?

A. Yes. I addressed this very issue in Docket Nos. 87-0427 and 94-0065. In those dockets I argued that, while there does exist an opportunity cost associated with in-place meters, and so there is a continuing marginal capital cost associated with in-place meters, a large portion of the cost of meters is sunk and so should be excluded from the calculation of the marginal capital cost of meters. I also argued that, because service drops are not reused as a general proposition, the entire capital cost of service drops should be excluded from the calculation of the marginal customer cost. I provided the Commission with a technical appendix to my testimony in both of these cases that explains in detail why and

what portion of these costs are sunk and what the resulting continuing marginal capital cost of meters should be. I am providing the attachment from Docket 94-0065 as Appendix A, DOE Exhibit 2.1, in this proceeding as well.

Q. WAS THE EXCLUSION OF THE SUNK METER AND SERVICE DROP COSTS CRITICAL TO THE ULTIMATE DETERMINATION OF CLASS REVENUES IN EITHER OF THOSE PROCEEDINGS?

A. No. Class revenues varied so significantly from full EPMC revenue requirements that totally eliminating the capital cost component of marginal customer costs, given the rate continuity constraints that were under consideration, had no effect on the resulting class revenue adjustments. It may have been for this reason that the Commission was uninterested in adopting my suggested revision to the calculation of marginal customer costs in those cases.

Q. HAVE YOU BEEN ABLE TO ESTIMATE WHAT THE PROPER MARGINAL CUSTOMER COSTS WOULD BE IF SUNK CAPITAL COST WERE EXCLUDED FROM THE COMPANY'S CALCULATION?

A. Not entirely. Discovery responses in those previous dockets clearly indicated that ComEd does not generally reuse service drops. Thus, the entire capital cost component of the Company's estimate of Marginal Customer-Related Costs can be eliminated. I have done this on page 1 of DOE Exhibit 2.2, which is a recalculation of page 28 of the Company's Exhibit 13.1. However, only a portion of the capital cost of meters is sunk and therefore properly excludable from the calculation of the marginal meter cost. Since I do not have the necessary information regarding the cost of installation, removal and refurbishment, I could not make the appropriate adjustment to the Company's marginal metering cost estimate. My analysis indicates, however, that most of the initial capital cost will be

sunk. Thus, to develop an approximate idea of the impact that this correction would have on resulting class revenues, I have eliminated 100 percent of the capital cost associated with the installation of meters. This adjustment is provided on page 2 of DOE Exhibit 2.2, which is a recalculation of page 18 of ComEd Exhibit 13.1.

Q. WHAT IS THE IMPLICATION OF MAKING THESE ADJUSTMENTS TO THE MARGINAL CUSTOMER COST?

A. As one would expect, there is a significant reduction in the total of marginal costs, and an even larger relative reduction in the share of total costs attributable to the residential class. Specifically, the residential class' marginal cost responsibility falls from 57 percent to 55 percent. The revenue reconciliation factor rises from about 80 percent to nearly 89 percent. Applying the EPMC reconciliation method results in a shift of revenue responsibility from the residential to the other classes of approximately $34 million at the Company's requested revenue level. The recalculated class revenue responsibilities with my adjustments to marginal customer costs are provided on page 3 of DOE Exhibit 2.2.

Q. DO THESE CLASS REVENUES PROVIDE AN APPROPRIATE BASIS UPON WHICH TO SET CLASS REVENUES AND RATES BY THE COMMISSION?

A. I think these cost estimates provide a reasonable basis for setting class revenues, as long as the Commission recognizes that they understate, by the amount of the continuing marginal capital cost of meters, the cost responsibility of the residential classes. It is interesting to note that, based on the total revenues requested by the Company, the residential class revenues that result from this calculation are approximately $34 million below the revenues assigned to the residential classes by the Company using the results of its marginal cost study; but approximately $36 million above the embedded cost-based residential revenues that would result from use of the Company's embedded cost study;

and nearly $210 million more than the residential embedded cost-based revenues proposed by Mr. Bodmer.

**Metering and Billing Backout Credits**

Q. DR. SWAN, WHAT IS YOUR INTEREST IN THE CALCULATION OF BACKOUT CREDITS FOR METERING AND FOR THE SINGLE BILL OPTION?

A. My reading of the Commission's Order in Docket No. 99-0117 indicates that one of the major reasons the Commission abandoned the use of marginal costs in determining delivery services class revenues and rates is that the use of the Company's marginal cost approach to establish metering and billing backout credits provided what it believed to be an inadequate incentive for the development of effective competition in the provision of these services. As I indicated in my direct testimony, I view the abandonment of marginal cost pricing to deal with this relatively minor concern a good example of "throwing the baby out with the bath water."

Q. IN YOUR OPINION, HAVE ANY OF THE INTERVENOR OR COMPANY REBUTTAL WITNESSES PROVIDED USEFUL ASSISTANCE TO THE COMMISSION ON THIS QUESTION?

A. Yes. I believe Mr. Craig Goodman of the National Energy Marketers Association has provided some very useful background information about the similar difficulties that the New York Public Service Commission faced when addressing this issue, and the way in which that commission resolved it. The New York Commission concluded that the amount of the backout credits should be based on the utility's long-run avoided cost. As important, that commission specified that the calculation of long-run avoided cost should

"be derived based on an assumption that the utilities exit the retail billing function for all customers or, alternatively, based on the incremental cost for the total billing function if it were being established today." In short, the long-run incremental cost should be based on adding the entire function from scratch, as if this were a new activity for the utility. What the New York Commission also said is that, if those estimates could not be provided immediately, then average embedded cost could be used as a proxy. However, the New York Commission leaves little doubt that it remains committed to the use of marginal cost, and specifically states that embedded cost shall be used only until the utilities are able to complete their long-run avoided cost studies and have those studies approved by the Commission.

Q. WHAT IS THE RELEVANCE OF THIS INFORMATION?

A. The New York Commission got to what I believe is the crux of the issue. The most efficient way to provide metering and billing services in the short run is to permit the Company to base its backout credits on short-run avoided cost. That will ensure that the resources already in place in the ComEd system will be utilized to their fullest extent and that alternative resources will not be used to provide these services unless they can be provided at a cost lower than ComEd's short-run avoided cost. This is the Company's argument.

On the other hand, providing a credit equal to only the short-run avoided cost will not ensure that the most efficient supplier gets the metering or billing business in the long run. To ensure that occurs requires that the credits be based on ComEd's long-run avoided cost. Requiring that the long-run avoided cost be based on the cost of avoiding the entire metering or billing function is intended to reflect the same incremental cost that a new entrant competitor would face in providing the service. This is close to the

448 argument of many of the intervenors, although most argue for the credits to be based on
449 embedded cost, without drawing the important distinction emphasized by the New York
450 Commission that embedded cost should only provide a temporary proxy for the properly
451 calculated long-run avoided cost.

452 Q. DOES YOUR ADJUSTMENT TO THE COMPANY'S ESTIMATE OF
453 MARGINAL CUSTOMER COST BEAR ON THIS ISSUE IN ANY WAY?

454 A. It does in one sense. Part of the concern of many intervenors seems to be that there is a
455 very large discrepancy between the Company's estimate of the marginal cost of metering
456 and billing and the short-run avoided cost of these functions. Part of that reason is that
457 the Company incorrectly includes all of the sunk capital costs associated with providing
458 access to the system. If those sunk costs are properly excluded from the calculation of
459 marginal customer cost, the difference between the cost of adding a new customer and
460 eliminating the metering or billing requirements of a customer would be considerably
461 closer.

462 However, it is important to keep in mind that the Company should be allowed to
463 recover in its regulated rates the embedded costs it has incurred. The problem with using
464 embedded costs as the basis for metering and billing credits is that, given the kind of
465 technological progress in metering and billing that has and is expected to occur, an
466 embedded cost-based credit may exceed the long run incremental cost faced by a new
467 competitor. That will provide an artificial filip to the competition.

468 Also important is the question of who will pick up the difference between the
469 long-run avoided cost (or the embedded cost proxy) and the short-run avoided cost, which
470 actually defines the saving that ComEd will realize every time it loses the responsibility
471 for metering or billing a customer. As long as the metering and billing rates are subject to

rate of return regulation, and as long as ComEd is obligated to provide the service to all customers who prefer to stay with the incumbent, then other remaining customers would be required to pick up the unrecovered costs of the billing and metering systems. That could have the perverse effect of driving metering and billing prices up for those who stay, encouraging more and more customers to opt for the services of the incumbent's competitors, further increasing the prices for the ever shrinking group that remain with ComEd.

Q. HOW IS THIS AFFECTED BY THE FACT THAT THERE IS A RATE FREEZE IN EFFECT UNTIL 2006?

A. Since rates are capped for the remainder of the transition period, the Company would be forced to pick up the difference between the allowed credit and its short-run avoided cost until new bundled rates can be established. Perhaps that adverse impact could be mitigated by deferring the verified amounts of these losses as a regulatory asset to ensure that the Company remains whole. Whether that is even permitted under the existing legislation or Commission rules goes beyond the scope of my expertise.

Q. GIVEN THIS APPARENT DILEMMA, WHAT ADVICE WOULD YOU OFFER THE COMMISSION?

A. To begin, I agree with Mr. Bodmer's suggestion that excessive resources are being devoted to what amounts to a relatively minor component of total costs. In the same vein, I would urge the Commission not to let the way it disposes of this issue determine the answer to the broader question whether class revenues and rates should be determined on the basis of marginal or embedded costs.

It has always been my understanding that the need for competitive metering and billing was to permit alternative suppliers to offer innovative services that might not be

possible with traditional metering and billing controlled by the incumbent utility. If that is the primary reason for making these services competitive, then it matters less, it seems to me, whether the credits for metering and billing services are sufficient to encourage the development of new stand-alone metering and billing companies. On the other hand, as long as the Company is made whole for the difference between the metering and billing credits and its short-run avoided cost, it seems to me that it should not matter if rates are based on long-run avoided costs. In fact, that approach has appeal to me. However, if the Commission allows the use of embedded cost as a proxy for the appropriately determined long-run avoided cost, that should be an abberation to the generally applied principle of basing class revenues and rates on marginal costs.

**High Voltage Delivery Services Rate Design**

Q. IN YOUR DIRECT TESTIMONY YOU CRITICIZED THE COMPANY'S CALCULATION OF THE HVDS CREDIT THAT IT WOULD PRESUMABLY PROPOSE IF THE COMMISSION DETERMINED THAT THE CREDIT SHOULD BE BASED ON MARGINAL COSTS AND UNRATCHETED RATHER THAN RATCHETED BILLING DEMANDS. WHAT WAS THE GIST OF THIS CRITICISM?

A. I took issue with the Company's decision to increase the facilities charge to recover the facilities related revenue requirement from fewer billing demands with no offsetting increase in the HVDS credit. I argued that the rates based on ratcheted and unratcheted billing demands should be revenue neutral for the customers qualifying for the HVDS credit. I proposed an alternative calculation of the HVDS credit for the class of

customers with demands in excess of 10,000 kW that would leave that subset of customers revenue neutral under ratcheted and unratcheted demand charges.

Q. DID THE COMPANY RESPOND TO YOUR PROPOSED ALTERNATIVE HVDS CREDIT BASED ON UNRATCHETED BILLING DEMANDS?

A. Yes. At page 16 of the panel rebuttal testimony of Mr. Alongi and Ms. Kelly (ComEd Ex. 32.0), my proposed alternative calculation is addressed. Mr. Alongi and Ms. Kelly seem to accept the general appropriateness of maintaining revenue neutrality for high voltage customers under ratcheted and unratcheted rates, although they painstakingly emphasize their conviction that ratcheted rates should be adopted by the Commission. They also provide an alternative revenue-neutral calculation of the HVDS credit based on unratcheted rates, but one that would maintain revenue neutrality for all customer classes to which the HVDS credit is applicable. As Mr. Alongi and Ms. Kelly state, "this alternative calculation provides for an HVDS credit of $3.54/kW based upon the originally requested revenue requirement, an EPMC rate design, and the use of monthly demands..."

Q. DO YOU ACCEPT THE REVISED UNRATCHETED CALCULATION OF THE HVDS CREDIT AS PRESENTED BY MR. ALONGI AND MS. KELLY?

A. Yes. This is a reasonable calculation of the credit, given the several assumptions on which it is based. Should the Commission decide to adopt the HVDS credit based on marginal costs, the EMPC method, unratcheted demands but a lower overall revenue requirement, I believe the method presented by Mr. Alongi and Ms. Kelly in their rebuttal testimony for calculating the HVDS credit should be used to determine the appropriate credit at the final allowed revenue requirement.

Q. HAVE YOU DETERMINED WHAT THE HVDS RATE SHOULD BE UNDER YOUR PROPOSED ESTIMATE OF ADJUSTED MARGINAL COST RESPONSIBILITY WITH RATCHETED AND UNRATCHETED BILLING DEMANDS IF THE COMMISSION ADOPTS AN EMPC MARGINAL COST RATE DESIGN?

A. I have recalculated the facilities demand charge and the HVDS credit for the class of customers with loads in excess of 10,000 kW. The customer and standard metering charge may also change, but I have not been able to replicate the Company's calculation of these minor charges and so I leave these recalculations to the Company. The only difference between the facilities demand charge and the HVDS credit calculated by Mr. Alongi and Ms. Kelly should be the revenue reconciliation factor that is applied to the full marginal cost. The Company's EPMC factor is 79.97 percent and the EPMC factor under my suggested revision to marginal costs is 88.7 percent. This will result in both a higher facilities demand charge and a higher HVDS credit. The Company's proposed unit charges and credits and my revised unit charges and credits under both a ratcheted and unratcheted rate design are provided in DOE Exhibit 2.3.

Q. DO YOU FIND ANY OF THESE UNIT CHARGES AND CREDITS ACCEPTABLE AS A BASIS FOR BILLING THE TWO DOE LABORATORIES, FERMI AND ARGONNE?

A. While these charges will still lead to an overcollection of distribution costs from these two large customers that are served directly from the transmission system, I do believe that the resulting high voltage credits go a long way toward eliminating the subsidies that are currently incorporated in the applicable delivery services rates for these two

customers. Therefore, I can recommend the adoption of any of these four sets of rates for the non-residential class with loads in excess of 10,000 kW.

Q. IN YOUR DIRECT TESTIMONY YOU STATED THAT THE COMPANY'S HVDS RATES BASED ON EMBEDDED COSTS WOULD CONTINUE TO OVERCHARGE CUSTOMERS LIKE FERMI AND ARGONNE. PLEASE REMIND US WHY THAT IS THE CASE.

A. Unlike most other customers that qualify for the HVDS credit, Fermi and Argonne do not actually use the components of the distribution system that go into calculating what the net distribution charge should be for qualifying HVDS credit customers. That is because Fermi and Argonne take their service directly from ComEd transmission lines and own and operate their own substations. They do not use high voltage electric service stations, high voltage distribution substations or high voltage lines, which comprise the bulk of the embedded costs allocated to the group of high voltage customers. As I stated in my direct testimony, to impose a net charge for these distribution system costs on customers like Fermi and Argonne that do not use the distribution system is patently unfair and violates the notion of charging customers on the basis of the costs they impose on the system.

Q. STAFF WITNESS LUTH DEVELOPS A DIRECT FACILITIES DEMAND CHARGE FOR HIGH VOLTAGE CUSTOMERS RATHER THAN PROVIDING A DISCOUNT TO THOSE CUSTOMERS OFF THE LOW VOLTAGE RATE. DOES MR. LUTH'S PROPOSAL PROVIDE A SOLUTION TO THE INEQUITY CONTAINED IN THE COMPANY'S EMBEDDED COST- BASED HVDS RATE?

A. No. Mr. Luth essentially uses the Company's embedded cost study with some adjustments. Specifically, he designs an HVDS rate that also allocates these same

facilities costs to the class of high voltage customers. Thus, customers like Fermi and Argonne will also be unfairly overcharged by the HVDS rate proposed by Mr. Luth.

Q. DID YOU SUGGEST AN ALTERNATIVE WAY TO TREAT CUSTOMERS SUCH FERMI AND ARGONNE IN YOUR DIRECT TESTIMONY?

A. Yes. In my direct testimony I propose a solution to the problem of unfairly imposing the costs of these distribution facilities on the relatively few customers, like Fermi and Argonne, that do not, in fact, use these distribution facilities. Specifically, I recommended that the distribution facilities demand charge and the HVDS credit be waived for these customers. Instead, special facilities charges should be determined to recover the ongoing cost to the Company of the "last inch" equipment that has been installed to serve them, in addition to the customer, standard metering, and other charges that would apply from the appropriate delivery services rate schedule. I argued that this approach would ensure that these customers paid for the "actual" embedded costs associated with providing them with service, but would not require that they unfairly pay for distribution equipment that they do not use.

Q. DID THE COMPANY RESPOND TO YOUR PROPOSAL?

A. Yes. In their rebuttal panel testimony, Ms. Clair and Mr. Crumrine have responded to my suggested solution by stating that it is "unworkable". They give the following two reasons for their conclusion:

1. "It would require extensive customer-specific calculations."
2. "There would be no guarantee that the charges to these customers would fully recover ComEd's costs or that they would reflect future revenue requirement levels."

612 Q. HOW DO YOU RESPOND TO THEIR EXPLANATION OF WHY YOUR
613 SUGGESTED SOLUTION IS UNWORKABLE.

614 A. I understand the Company's reluctance to tailor rates to the circumstances of specific
615 customers. They have the legitimate concern that, once that door is open, other customers
616 will try to enter. At the same time, the use of special facilities charges has a long history
617 in the electric utility industry as a means by which very unusual circumstances can be
618 accounted for when assigning costs. I believe this is clearly one of those very unusual
619 circumstances. Special facilities charges can provide a means by which to eliminate a
620 patently unfair overcharge to a few customers without sacrificing the overall logic of the
621 rate design.

622 The two issues that Ms. Clair and Mr. Crumrine have raised can be easily dealt
623 with. First, it is highly unlikely that this special arrangement would apply to more than a
624 few customers. In addition, the information regarding the "last inch" facilities that apply
625 to each of these few special customers has likely already been gathered in the process that
626 the Company went through when splitting its facilities between transmission and
627 distribution. That clearly was the case with Fermi and Argonne when I asked for the
628 specific "last inch" facilities that were used to serve these two customers through
629 discovery requests in Docket No. 99-0117.

630 The Company's concern about not being fully compensated for its costs is also
631 easily dealt with. First of all, if we are dealing in a world of embedded costs, it would
632 seem that all the Company needs to ensure is that it's annual carrying costs are fully
633 recovered. I anticipate that provides the basis for most of the special facilities contracts
634 that it enters into with its large customers. If the Company is concerned about recovering
635 its allowed rate of return on these investments or the full share of O&M and A&G, both

of which costs, can vary from rate case to rate case, this can easily be written into the contract for the rental of the special facilities. A formula rate can be established which would modify the special facilities charge annually as these cost components change. In fact, if the Commission were to approve such a formula rate, there would be no negotiation. Rather, the customer would simply be required to pay a charge based on the Commission-approved formula rate. The Company would get the forward-looking protection Ms. Clair and Mr. Crumrine are concerned about, without having to spend resources negotiating these terms with each individual, qualifying customer.

The bottom line is, very few customers are probably qualified, the data requirements are not onerous and may already have been accumulated, and the Company can ensure that it will recover full forward looking costs through a formula rate that could be approved in advance by the Commission. The benefit is to eliminate a patently unfair overcharge without having to sacrifice the integrity of the overall rate design. Contrary to the opinion of Ms. Clair and Mr. Crumrine, the solution is eminently workable.

Q. A NUMBER OF INTERVENOR WITNESSES HAVE CRITICIZED THE COMPANY'S PROPOSED HVDS CREDIT. WOULD YOU PLEASE COMMENT ON THOSE CRITICISMS.

A. A number of witnesses have suggested that, while it is appropriate to provide a high voltage credit to recognize the fact that it costs less to provide delivery service to high voltage customers, it is not appropriate to make up the revenue loss from those discounts through higher charges to low voltage customers. For example, Dr. Ulrich, testifying on behalf of the ARES Coalition, states that, "Edison has not shown that the cost of service is a 'zero-sum game.'"

Q. DO YOU AGREE WITH THESE CRITICISMS?

A. No. The problem is that class cost-of-service studies, whether embedded or marginal, are designed to apportion the total revenue requirement among the various classes of customers. The design of rates for customers within a class will determine the apportionment of the class revenue requirement among customers with different usage patterns and characteristics, such as the voltage delivery level. Once the customer class revenue requirement is determined for, say, the class of non-residential customers with loads in excess of 10,000 kW, the rate design determines how high voltage and low voltage customers will pay for the total class revenue requirement. If all customers are treated the same (i.e., pay the same rate), even though the cost responsibility is substantially less for high voltage customers, it means that high voltage customers are being charged more than their fair share of costs, and low voltage customers are being charged less than their fair share of costs. In sum, there exists an intra-class cross subsidy from high voltage to low voltage customers. If a high voltage discount is offered to high voltage customers to reflect the cost differential, then low voltage customers must pay more (in fact their full share of class costs) because their subsidy has been reduced or eliminated. I cannot conceive of a rate design that would eliminate an existing cross-subsidy without raising the rates of the subsidized sub-group, unless the utility is caused to eat the difference.

Q. MR. HAYNES HAS TESTIFIED THAT THE PROVISION OF THE HVDS CREDIT IS ANTI-COMPETITIVE. DO YOU AGREE WITH THIS ARGUMENT?

A. No. As I understand Mr. Haynes argument, he believes that providing the HVDS credit is anti-competitive because it will increase the delivery services cost to low voltage customers, and thereby reduce the likelihood that those customers will purchase power

684 from ComEd's competitors, and increase the likelihood those customers will return to
685 ComEd bundled service. What Mr. Haynes fails to note, however, is that the overcharge
686 to high voltage customers is currently making it more difficult for them to save money by
687 purchasing power from ComEd's competitors. Eliminating the subsidy will have the
688 opposite effect. It will, other things constant, encourage more high voltage customers to
689 take delivery service from ComEd and buy their power from alternative suppliers. In
690 general, one does not usually think of eliminating cross-subsidies in prices as being anti-
691 competitive. In fact, those kinds of actions are often considered to be remedies in the
692 settlement of anti-trust suits.

693 Q. MR. STEPHENS FOR IIEC HAS PROPOSED THAT ANY HVDS CREDIT BE
694 PHASED IN. PLEASE COMMENT ON MR. STEPHENS' PROPOSAL.

695 A. Mr. Stephens proposes that only half the allowed credit be implemented for the first two
696 years, after which the allowed credit would increase to its full value. What Mr. Stephens
697 is recommending is that high voltage customers be required to continue to subsidize low
698 voltage customers for another two years. We are not talking about small residential
699 customers, where rate continuity is vital because rate shocks can leave low income
700 families with no power to heat their homes during winter months. We are talking about
701 one business being required to subsidize another, which runs counter to the whole idea of
702 placing the provision of electric utility service on a competitive free market basis. I
703 believe there is little merit to Mr. Stephens's proposal and urge the Commission to
704 implement the full value of whatever HVDS credit it determines is appropriate.

705 Q. MR. CHALFONT FOR IIEC TESTIFIES THAT THE COMPANY HAS
706 INCORRECTLY CALCULATED THE HVDS CREDIT. DO YOU AGREE
707 WITH MR. CHALFONT?

A. No. Mr. Chalfont is incorrect. He states that the Company has overstated the credit because it applied the difference in the cost to serve high and low voltage customers as a credit "to all customers, not just those served at below 69 kV." Mr. Alongi and Ms. Kelly have correctly pointed out Mr. Chalfont's error in their panel rebuttal testimony. The credit should be based on the rate applied to low voltage customers, and this is what is done by the Company. This can be demonstrated fairly simply. If one accepts that the difference between serving high and low voltage customers is $3.31 per kW, we can calculate what should be the rate that applies to the low voltage customers for the class of customers with loads in excess of 10,000 kW. The weighted average cost of distribution facilities is $2.20/kW. (ComEd Exhibit 3.3, p. 3) Total billing kW for high and low voltage customers are also provided in ComEd Exhibit 3.3, p. 3. The weighted average cost is thus determined as:

$$2.20 = \{13{,}371{,}570\ (L - 3.31) + 13{,}813{,}581\ L\} / 27{,}185{,}151,$$

where L is the cost to serve low voltage customers. Solving this equation for L shows that the cost to serve low voltage customers is $3.82/kW. The cost to serve high voltage customers is $.51/kW. The appropriate credit off the low voltage rate is $3.31 reduced by the revenue reconciliation factor of 0.7997, or $2.65/kW.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY AT THIS TIME?

A. Yes.

APPENDIX A

TO THE REBUTTAL TESTIMONY

OF

DALE E. SWAN

ComEd Docket No. 01-0423

## THE MEASUREMENT OF MARGINAL CUSTOMER COSTS

Q. DR. SWAN, HAVE YOU EVALUATED THE APPROPRIATENESS OF INCLUDING THE CARRYING COST OF A NEW METER AND SERVICE DROP IN THE MEASURE OF THE MARGINAL CUSTOMER COST, AND APPLYING THAT COST TO ALL CUSTOMERS ON THE SYSTEM?

A. Yes, I have.

Q. WHAT DOES YOUR ANALYSIS SHOW?

A. My analysis shows that there does exist a continuing marginal capital cost associated with the provision of system access to most customers. However, that continuing cost is less than the carrying costs associated with the installation of new equipment.

Q. PLEASE EXPLAIN YOUR ANALYSIS.

A. It is important to start with the recognition that the meter and drop line provide a service to the customer, which can be referred to as "access to the system." It is also important to note that this system-access service may be provided equally well by used or by new meters and by used or new service drops of the same capacity. That is, the customer is

indifferent as to whether he gains access to the system over a new or used service line, and as to whether his usage is measured by a new or a used meter, as long as his system access and the measurement of his usage are acceptably reliable. Thus, a new establishment, say, a new single-family residence, can be given acceptable access to the system with either new or used equipment. Therefore, there is, at least potentially, an opportunity cost associated with used, in-place equipment.

Q. WHAT ARE THE CAPITAL COSTS TO THE UTILITY OF PROVIDING ACCESS TO THE SYSTEM TO A NEW CUSTOMER AT A NEW LOCATION?

A. Let me focus first on the required provision of a meter, and later I can extend the analysis to include the provision of other necessary equipment. If new equipment is used, the costs to the Company will include the market price of a new meter plus the labor and miscellaneous materials costs of handling, testing and installing the new meter. Installation costs are usually capitalized by the utility, and so an unbundled rate for the use of the meter must be set so as to recover the annual carrying cost of the total installed cost of the meter over its useful life. This annual carrying cost is equivalent to the annual rental value of the installed meter, and the present value of the stream of rental values should be equal to the capitalized installed cost of the meter.

Q. IS THIS ANNUAL CARRYING COST THE CONTINUING MARGINAL CAPITAL COST OF THE METER?

A. No. This is the embedded cost experienced by the Company, and the rate must be set high enough to allow the Company to recover the embedded cost. Otherwise, the Company would be unwilling to invest in meters unless the associated costs were

recovered through other charges such as the energy charge. However, the continuing marginal capital cost will be lower than the rental value associated with the installed cost of a new meter, because two components of the total installed cost must be viewed as sunk. These two components are the cost of installation and the cost of retrieval and refurbishment of used meters.

Q. WHY SHOULD THE COST OF INSTALLATION BE CONSIDERED A SUNK COST?

A. The continuing marginal cost of any meter is defined by the value of its next best alternative use. Assume a new meter costs $45, and the capitalized cost of installing a meter is $5, for a total installed cost of $50. If there were no cost associated with retrieving and refurbishing an in-place meter, then the value of any meter, once installed, is the cost that could be avoided by using that meter to serve a new customer at a new location rather than purchasing a new meter. Since the $5 installation cost cannot be avoided, it does not enter into the continuing marginal capital cost associated with leaving the in-place meter where it is to serve the existing customer. Thus, only the rental value associated with the market price of the new meter can be considered a continuing marginal capital cost. In our example, the levelized annual carrying cost of the installed $50 cost of a new meter is $7.62 (30 years at 15 percent), but only $6.85 is included as the continuing marginal cost of a meter. The remaining $0.77 represents the levelized recovery of the cost of installation and is not part of the continuing marginal costs.

Q. DOES THE AGE OF THE IN-PLACE, USED METER AFFECT ITS CONTINUING MARGINAL COST?

A. Yes. There are two effects on the continuing marginal capital cost which depend on the length of the remaining life of a used, in-place meter. One of these effects is related to the cost of retrieving and refurbishing in-place, used meters. In our present example, I am assuming this cost to be zero, but I will address this cost element shortly. The other effect has to do with the cost of installation. Assume a used, 15-year-old meter is installed, with a remaining life of 15 years. Assume also that a new equivalent meter has a 30-year life. With a 15-year shorter life, the used meter will require replacement 15 years earlier than a new meter. That means the $5 installation cost has to be incurred 15 years earlier with the used meter than with the new meter. The difference between the present value of the installation cost 15 years hence and 30 years hence must be subtracted from the present value of the stream of rental values associated with the used meter to determine its continuing marginal capital cost. This can be considered as a used meter penalty.

The difference in the present values of $1 spent 15 years from now and 30 years from now (at a 15 percent discount rate) is 0.1078. Thus, the market value of the used meter must be reduced by 10.78 percent of the $5 installation cost, or by $0.539. The annual rental value that can be recovered by deploying the used meter is $7.615, which is defined by the levelized annual carrying cost of a new meter, including the installation cost. However, the market value of the used meter is related only to the $45 market price of the new meter, exclusive of installation cost. The levelized annual rental value of $45 over 30 years at 15 percent is $6.854. The present value of $6.854 for 15 years at 15 percent is $40.075. From this amount must be subtracted the $0.539 used meter penalty, which results in a market value of the 15-year-old meter of $39.536. The annual levelized cost associated with this market value is $6.761 for 15 years at 15 percent, and

this amount is the continuing marginal capital cost of the 15-year-old meter, assuming it costs nothing to retrieve and refurbish the in-place, used meter. In addition to recovering this levelized annual cost, the Company must also recover the $5 installation cost over 15 years which, at a 15 percent return, amounts to $0.855 per year on an annualized basis. Thus, the total embedded cost that must be recovered in rates is $7.616 which, when rounded, is the same levelized annual cost associated with installing a new meter.

Q. HOW DOES THE COST OF RETRIEVAL AND REFURBISHMENT AFFECT THE CONTINUING MARGINAL CAPITAL COST OF A METER?

A. The cost of retrieval and refurbishment (R&R) is another sunk cost that must be subtracted from the stream of annual rental payments to determine the market value of an in-place, used meter, and so also its opportunity cost and its continuing marginal capital cost. To demonstrate that this is so, assume that it costs $20 to retrieve and refurbish the 15-year-old meter in our example. The present value of the stream of rental payments that could be recovered from reusing this meter, after deducting the installation cost and the used meter penalty, is $39.536. But it will cost the Company $20 to realize this revenue stream, and therefore this in-place meter has a market value or opportunity cost of $19.536. The levelized annual cost over its remaining 15-year life is $3.341 at 15 percent. This is the continuing marginal capital cost of keeping the 15-year-old meter where it is to provide system access to the customer who is presently using it.

Of course, the Company must continue to recover the total levelized cost of reusing the old meter, including all of its sunk costs. There are three components to the levelized revenues that the Company must recover:

| | |
|---|---|
| • the cost of the market value of a 15-year old, used meter | $3.341 |
| • the $5 cost of installation over 15 years at 15 percent | 0.855 |
| • the cost of the $20 R&R levelized over 15 years at 15 percent | 3.420 |
| Total | $7.616 |

These three components sum to $7.62 (rounded), which is the same total annual levelized cost associated with the use of a new meter. What is important to keep in mind, however, is that only $3.341 of this cost (of a 15-year old, used meter) represents a continuing marginal capital cost and that the remaining components are made up of the sunk costs of R&R and installation.

Q. WHAT OTHER EFFECT DOES THE REMAINING LIFE OF AN IN-PLACE, USED METER HAVE ON ITS CONTINUING MARGINAL CAPITAL COST?

A. We may assume that the price of a new meter is given, and that the sum of the R&R and installation costs either remains constant or might, in fact, rise as the remaining life of the in-place meter falls. Since the period of time over which to amortize the R&R and installation costs falls as the remaining life of the meter falls, the market value of in-place, used meters will also fall as they get older. Thus, the levelized annual continuing marginal capital cost will also fall as the remaining useful life of the meter falls. In fact, when the remaining life is too short for the present value of the stream of rental values to

recover the R&R and installation costs, the meter has no positive market value and so the continuing marginal capital cost falls to zero. In our example, with a combined R&R and installation cost of $25, that break-even point occurs at a remaining life of just under five years at a 15 percent discount rate. Thus, the continuing annual marginal capital cost of meters with remaining lives of less than five years is zero, and the annual marginal cost rises to a maximum of $3.808 for an in-place, used meter with a remaining life of 30 years, which is the same as the remaining life of a new equivalent meter. The relationship between the continuing marginal capital cost and the remaining life of in-place, used meters is shown in Schedules 1 and 2 to this Appendix.

Q. DOES YOUR ANALYSIS EXTEND TO THE CONTINUING MARGINAL CAPITAL COSTS OF SERVICES AS WELL AS OF METERS?

A. Yes, as long as services are reused to provide system access to other customers and therefore have an alternative use and an opportunity cost. In fact, my experience indicates that used meters are reused but that used services generally are not. In that case, only some portion of the carrying cost of a new meter should enter into the determination of the continuing marginal customer cost.

Q. HOW CAN THIS THEORETICAL FRAMEWORK BE USED TO ESTIMATE MARGINAL CUSTOMER COSTS?

A. The continuing marginal capital costs associated with meters and service drops could be estimated for each class with the following class-specific information:

- market price of new meters;
- economic life of new meters;
- meter installation cost;

- meter retrieval and refurbishment (R&R) cost;
- the appropriate levelized carrying cost rate; and
- the distribution of remaining lives of in-place meters.

This information would permit the estimation of the continuing marginal capital costs of meters for each relevant cohort based on the remaining life of the equipment. To these estimates of the capital component of marginal customer costs for each class should be added O&M expenses and customer accounting and collecting expenses to obtain the total of marginal customer costs for each class and for the jurisdiction as a whole. These non-capital costs must be added because these expenses are clearly recurring costs that must continue to be incurred at the margin to provide all customers with acceptable access service.

SCHEDULE 1

Example of Composition of Levelized Rental
Value of In-Place Meter at Varying Remaining Lives

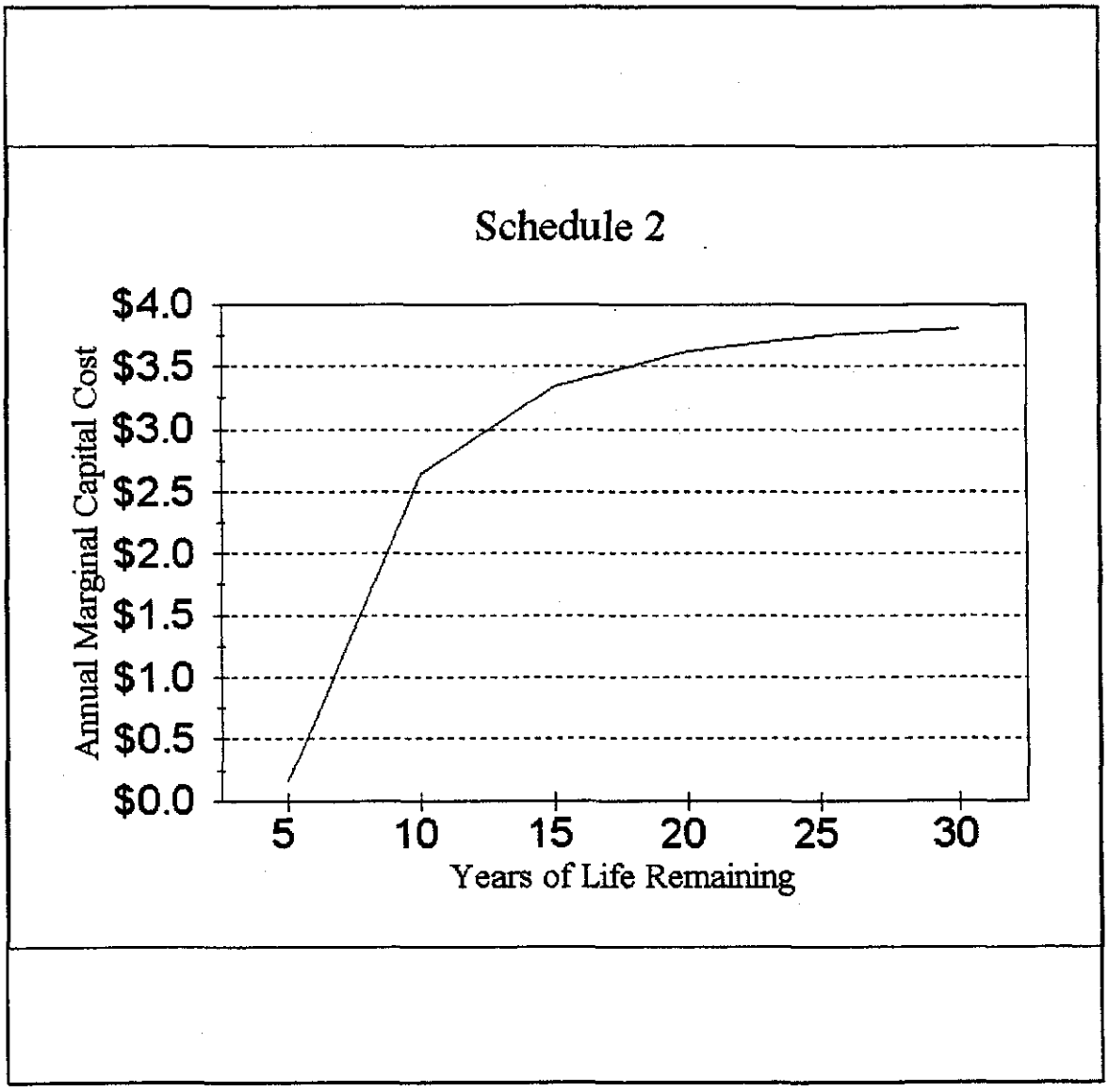
| Years of Remaining Life | Levelized Recovery of Installation Cost | R&R Cost | Market Value | Annual Rental Value |
|---|---|---|---|---|
| 5 | $1.492 | $5.966 | $0.158 | $7.616 |
| 10 | .996 | 3.985 | 2.635 | 7.616 |
| 15 | .855 | 3.420 | 3.341 | 7.616 |
| 20 | .799 | 3.195 | 3.622 | 7.616 |
| 25 | .773 | 3.094 | 3.749 | 7.616 |
| 30 | .762 | 3.046 | 3.808 | 7.616 |

Assumptions:

| | | |
|---|---|---|
| (1) Market price of new meter | = | $45 |
| (2) Installation cost | = | $ 5 |
| (3) R&R cost | = | $20 |
| (4) Annual discount rate | = | 15% |

SCHEDULE 2

Example of Declining Continuing Marginal Cost of a Meter
as Remaining Life of In-Place Meter Declines



**Commonwealth Edison Company**
***Marginal Customer-Related Costs***
**(Revised Com Ed exhibit 13.1-pg 28)**

| | Cost of Services | Accounting & Collecting | Total Service Costs |
|---|---|---|---|
| **Residential** | | | |
| Single Family-NO SP HT | 35,405,455 | 95,929,520 | 131,334,975 |
| Single Family-SP HT | 1,382,417 | 2,319,048 | 3,701,465 |
| Multi-Family-NO SP HT | 3,251,046 | 50,075,229 | 53,326,275 |
| Multi-Fam-SP HT | 811,104 | 7,987,399 | 8,798,503 |
| *Fixture Included Lighting* | 0 | 42,739 | 42,739 |
| | | | **197,203,957** |
| **Non-Residential** | | | |
| Watt-hour Only Meter | 825,875 | 5,033,066 | 5,858,941 |
| 0-25 kW | 1,096,799 | 6,937,784 | 8,034,583 |
| 25-100 kW | 1,013,001 | 3,022,984 | 4,035,985 |
| 100-400 kW | 0 | 1,538,457 | 1,538,457 |
| 400-800 kW | 0 | 654,704 | 654,704 |
| 800-1,000 kW | 0 | 168,223 | 168,223 |
| 1,000-3,000 kW | 0 | 3,864,186 | 3,864,186 |
| 3,000-6,000 kW | 0 | 871,025 | 871,025 |
| 6,000-10,000 kW | 0 | 237,211 | 237,211 |
| Over 10,000 kW | 0 | 264,697 | 264,697 |
| Fixture Included - Non Res | 0 | 44,255 | 44,255 |
| | | | **25,572,267** |
| **Street Lighting** | | | |
| Dusk to Dawn | 0 | 82,289 | 82,289 |
| All Other Lighting | 0 | 28,065 | 28,065 |
| | | | **110,354** |
| **Pumping** | 0 | 32,354 | 32,354 |
| **Railroads** | 0 | 5,474 | 5,474 |
| **Total** | **43,785,697** | | **222,924,406** |

**Commonwealth Edison Company**
**Marginal Metering Costs**
***(Revised Com Ed exhibit 13.1-pg 18)***

| | Cost of Meters | Accounting & Collecting | Total Meter Costs |
|---|---|---|---|
| **Residential** | | | |
| Single Family-NO SP HT | 8,666,132 | 24,814,451 | 33,480,583 |
| Single Family-SP HT | 195,767 | 563,336 | 759,103 |
| Multi-Family-NO SP HT | 3,934,634 | 12,170,342 | 16,104,976 |
| Multi-Fam-SP HT | 635,487 | 1,884,942 | 2,520,429 |
| Fixture Included Lighting | 0 | 0 | 0 |
| | | | **52,865,091** |
| **Non-Residential** | | | |
| Watt-hour Only Meter | 458,241 | 1,314,636 | 1,772,877 |
| 0-25 kW | 819,903 | 1,771,835 | 2,591,738 |
| 25-100 kW | 318,654 | 629,464 | 948,118 |
| 100-400 kW | 197,654 | 209,222 | 406,876 |
| 400-800 kW | 44,103 | 247,304 | 291,407 |
| 800-1,000 kW | 7,538 | 42,287 | 49,825 |
| 1,000-3,000 kW | 20,934 | 90,787 | 111,721 |
| 3,000-6,000 kW | 4,587 | 19,914 | 24,501 |
| 6,000-10,000 kW | 1,210 | 5,239 | 6,449 |
| Over 10,000 kW | 2,541 | 11,038 | 13,579 |
| Fixture Included - Non Res | 0 | 0 | 0 |
| | | | **6,217,091** |
| **Street Lighting** | | | |
| Dusk to Dawn | 5,150 | 14,635 | 19,785 |
| All Other Lighting | 781 | 2,240 | 3,021 |
| | | | **22,806** |
| **Pumping** | 28,618 | 159,040 | 187,658 |
| **Railroads** | 3,382 | 18,109 | 21,491 |
| **Total** | **1,913,296** | | **59,314,137** |

## COMMONWEALTH EDISON COMPANY
## Revised Revenue Requirement

| | Meter Cost | Customer Cost | Distribution | Revised MC | Revenue Requirement Factor* | Revenue Requirement by Class |
|---|---|---|---|---|---|---|
| **Residential** | | | | | | |
| Single Family-NO SP HT | 33,480,583 | 131,334,975 | 643,195,375 | 808,010,933 | 0.887 | 716,432,403 |
| Single Family-SP HT | 759,103 | 3,701,465 | 30,363,990 | 34,824,558 | 0.887 | 30,877,604 |
| Multi-Family-NO SP HT | 16,104,976 | 53,326,275 | 130,685,863 | 200,117,114 | 0.887 | 177,436,194 |
| Multi-Fam-SP HT | 2,520,429 | 8,798,503 | 46,333,667 | 57,652,599 | 0.887 | 51,118,355 |
| Fixture Included Lighting | 0 | 42,739 | 77,424 | 120,163 | 0.887 | 106,544 |
| | | | | **1,100,725,367** | 0.887 | **975,971,100** |
| **Non-Residential** | | | | | | |
| Watt-hour Only Meter | 1,772,877 | 5,858,941 | 18,888,835 | 26,520,653 | 0.887 | 23,514,849 |
| 0-25 kW | 2,591,738 | 8,034,583 | 84,775,231 | 95,401,552 | 0.887 | 84,588,909 |
| 25-100 kW | 948,118 | 4,035,985 | 159,065,862 | 164,049,965 | 0.887 | 145,456,832 |
| 100-400 kW | 406,876 | 1,538,457 | 167,845,605 | 169,790,938 | 0.887 | 150,547,133 |
| 400-800 kW | 291,407 | 654,704 | 110,514,038 | 111,460,149 | 0.887 | 98,827,453 |
| 800-1,000 kW | 49,825 | 168,223 | 32,117,551 | 32,335,599 | 0.887 | 28,670,739 |
| 1,000-3,000 kW | 111,721 | 3,864,186 | 128,658,745 | 132,634,652 | 0.887 | 117,602,075 |
| 3,000-6,000 kW | 24,501 | 871,025 | 69,814,671 | 70,710,197 | 0.887 | 62,696,028 |
| 6,000-10,000 kW | 6,449 | 237,211 | 31,071,506 | 31,315,166 | 0.887 | 27,765,960 |
| Over 10,000 kW | 13,579 | 264,697 | 59,676,786 | 59,955,062 | 0.887 | 53,159,861 |
| Fixture Included - Non Res | | 44,255 | 1,089,812 | 1,134,067 | 0.887 | 1,005,534 |
| | | | | **895,308,000** | 0.887 | **793,835,375** |
| **Street Lighting** | | | | | | |
| Dusk to Dawn | 19,785 | 82,289 | 4,279,334 | 4,381,408 | 0.887 | 3,884,827 |
| All Other Lighting | 3,021 | 28,065 | 1,115,031 | 1,146,117 | 0.887 | 1,016,218 |
| | | | | **5,527,525** | 0.887 | **4,901,045** |
| **Pumping** | 187,658 | 32,354 | 6,736,364 | **6,956,376** | 0.887 | **6,167,953** |
| **Railroads** | 21,491 | 5,474 | 6,846,600 | **6,873,565** | 0.887 | **6,094,527** |
| | **59,314,137** | **222,924,406** | **1,733,152,290** | **2,015,390,833** | | **1,786,970,000** |

* The revenue requirement remains equal to $1,786,970,000.

DOE Exhibit 2.3

COMMONWEALTH EDISON COMPANY

Non-Residential Over 10,000 kW
Facilities Charges and HVDS Credits
Based on an EPMC Reconciliation
and ComEd and DOE Estimated Marginal Cost

| | Ratcheted | | Unratcheted | |
|---|---|---|---|---|
| | Facilities Charge | HVDS Credit | Facilities Charge | HVDS Credit |
| ComEd Marginal Costs | $3.05 | $(2.65) | $4.14 | $(3.54) |
| DOE Marginal Costs | $3.39 | $(2.94) | $4.60 | $(3.93) |